WHAT IS CLAIMED IS:

1. An apparatus comprising:

a sign extractor having an input and first and second outputs, wherein the input of the sign extractor receives an input signal, wherein the first output provides a sign of the input signal, and wherein the second output provides a magnitude of the input signal;

a delay coupled to the first output, wherein the delay imposes a delay on the sign;

a square root extractor coupled to the second output, wherein the square root extractor has an output that provides an output signal, wherein the output signal is an approximation to a square root of the magnitude of the input signal; and,

a sign restorer coupled to the output of the square root extractor and to the delay, wherein the sign restorer applies the sign from the delay to the output signal from the square root extractor.

2. The apparatus of claim 1 wherein the input signal is a digital signal.

3. The apparatus of claim 2 wherein the input signal is complemented by the sign extractor to produce a signal having a positive sign bit and a signal having a negative sign bit, and wherein the sign extractor selects the signal having the positive sign bit to provide to the second output of the sign extractor.

4. The apparatus of claim 1 wherein the square root extractor comprises first and second stages.

5. The apparatus of claim 4 wherein the delay is a first delay, and wherein the first stage comprises:

a first multiplier arranged to form a product of the magnitude of the input signal and an approximation of an inverse of the square root of the magnitude of the input signal;

a summer arranged to add an output of the first multiplier to an approximation of the square root of the magnitude of the input signal;

a scaler arranged to scale an output of the summer substantially by ½; and,

a second delay having an input coupled to the output of the scaler, wherein the second delay is

arranged to pass the approximation of the square root of the magnitude of the input signal to the summer, and wherein the second delay has an output coupled to an input of the second stage.

6. The apparatus of claim 5 wherein the second stage comprises:

a second multiplier arranged to form a product of the input to the second stage with an output of the second stage;

a subtractor arranged to subtract an output of the second multiplier from a constant substantially equal to two;

a third multiplier arranged to form a product of an output of the subtractor with the output of the second stage and to provide the approximation of the inverse of the square root of the magnitude of the input signal; and,

a third delay coupled to an output of the third multiplier and arranged to provide the output of the second stage.

7. The apparatus of claim 1 wherein the sign restorer comprises a multiplier, and wherein the multiplier multiplies the output signal from the square root extractor by the sign provided by the first output of the sign extractor.

8. The apparatus of claim 1 wherein the square root extractor consists of multiplying, summing, scaling, and delaying functions.

9. The apparatus of claim 1 wherein the delay is a first delay, wherein the square root extractor comprises first, second, and third multipliers, first and second summers, second and third delays, and a scaler, wherein the first multiplier has a first input coupled to the second output of the sign extractor and a second input coupled to an output of the third multiplier, wherein the first summer has a first input coupled to an output of the first multiplier and a second input coupled to an output of the second delay, wherein the scaler has an input coupled to an output of the first summer and an output coupled to an input of the second delay, wherein the second multiplier has a first input coupled to the

output of the second delay and a second input coupled to an output of the third delay, wherein the second summer has a first input coupled to an output of the second multiplier and a second input coupled to a constant, wherein the third multiplier has a first input coupled to an output of the second summer and a second input coupled to the output of the third delay, and wherein the third delay has an input coupled to the output of the third multiplier.

10. The apparatus of claim 9 wherein the scaler applies a scaling function substantially equal to one-half, and wherein the constant is substantially equal to two.

11. The apparatus of claim 1 wherein the delay is a first delay, wherein the square root extractor comprises first, second, and third multipliers, first and second summers, second and third delays, and a scaler, wherein the first multiplier has a first input coupled to the second output of the sign extractor and a second input coupled to an output of the third multiplier, wherein the first summer has a first positive input

coupled to an output of the first multiplier and a second positive input coupled to an output of the second delay, wherein the scaler has an input coupled to an output of the first summer and an output coupled to an input of the second delay, wherein the second multiplier has a first input coupled to the output of the second delay and a second input coupled to an output of the third delay, wherein the second summer has a negative input coupled to an output of the second multiplier and a positive input coupled to a constant, wherein the third multiplier has a first input coupled to an output of the second summer and a second input coupled to the output of the third delay, and wherein the third delay has an input coupled to an output of the third multiplier.

12. The apparatus of claim 11 wherein the scaler applies a scaling function substantially equal to one-half, and wherein the constant is substantially equal to two.

13. A square root extractor consisting of multiplying, summing, scaling, and delaying functions.

14. The square root extractor of claim 13 wherein the multiplying function comprises first, second, and third multipliers, wherein the summing function comprises first and second summers, wherein the delaying function comprises first and second delays, wherein the scaling function comprises a scaler, wherein the first multiplier has a first input coupled to receive a signal whose square root is to be extracted and a second input coupled to an output of the third multiplier, wherein the first summer has a first input coupled to an output of the first multiplier and a second input coupled to an output of the first delay, wherein the scaler has an input coupled to an output of the first summer and an output coupled to an input of the first delay, wherein the first delay provides an output of the square root extractor, wherein the second multiplier has a first input coupled to the output of the first delay and a second input coupled to an output of the second delay, wherein the second summer has a first input coupled to an output of the second multiplier and a second input coupled to a constant, wherein the third multiplier has a first input coupled to an output of the second summer and a second input coupled to the output of the second delay,

and wherein the second delay has an input coupled to the output of the third multiplier.

15. The square root extractor of claim 14 wherein the scaler applies a value substantially equal to one-half, and wherein the constant is substantially equal to two.

16. The square root extractor of claim 13 wherein the multiplying function comprises first, second, and third multipliers, wherein the summing function comprises first and second summers, wherein the delaying function comprises first and second delays, wherein the scaling function comprises a scaler, wherein the first multiplier has a first input coupled to receive a signal whose square root is to be extracted and a second input coupled to an output of the third multiplier, wherein the first summer has a first positive input coupled to an output of the first multiplier and a second positive input coupled to an output of the first delay, wherein the scaler has an input coupled to an output of the first summer and an output coupled to an input of the first delay, wherein the first delay provides an output of the

square root extractor, wherein the second multiplier has a first input coupled to the output of the first delay and a second input coupled to an output of the second delay, wherein the second summer has a negative input coupled to an output of the second multiplier and a positive input coupled to a constant, wherein the third multiplier has a first input coupled to an output of the second summer and a second input coupled to the output of the second delay, and wherein the second delay has an input coupled to the output of the third multiplier.

17. The square root extractor of claim 16 wherein the scaler applies a value substantially equal to one-half, and wherein the constant is substantially equal to two.

18. A square root extractor comprising first, second, and third multipliers, first and second summers, first and second delays, and a scaler, wherein the first multiplier has a first input coupled to receive a signal whose square root is to be extracted and a second input coupled to an output of the third multiplier, wherein the first summer has a first input coupled to an output of

the first multiplier and a second input coupled to an output of the first delay, wherein the scaler has an input coupled to an output of the first summer and an output coupled to an input of the first delay, wherein the output of the first delay provides an output of the square root extractor, wherein the second multiplier has a first input coupled to the output of the first delay and a second input coupled to an output of the second delay, wherein the second summer has a first input coupled to an output of the second multiplier and a second input coupled to a constant, wherein the third multiplier has a first input coupled to an output of the second summer and a second input coupled to the output of the second delay, and wherein the second delay has an input coupled to the output of the third multiplier.

19. The square root extractor of claim 18 wherein the scaler applies a scaling function substantially equal to one-half.

20. The square root extractor of claim 18 wherein the constant is substantially equal to two.

21. The square root extractor of claim 20 wherein the scaler applies a scaling function substantially equal to one-half.

22. The square root extractor of claim 18 wherein the first input of the first summer comprises a first positive input, wherein the second input of the first summer comprises a second positive input, wherein the first input of the second summer comprises a negative input, and wherein the second input of the second summer comprises a positive input.

23. The square root extractor of claim 22 wherein the scaler applies a scaling function substantially equal to one-half, and wherein the constant is substantially equal to two.

24. A method comprising:

multiplying first and second signals to produce a third signal, wherein the first signal is a signal whose square root is to be extracted;

summing the third signal and a fourth signal to produce a fifth signal;

scaling the fifth signal to produce a sixth signal;

delaying the sixth signal to produce the fourth signal;

multiplying the fourth signal and a seventh signal to produce an eighth signal;

subtracting the eighth signal from a constant to produce a ninth signal;

multiplying the ninth signal and the seventh signal to produce the second signal; and,

delaying the second signal to produce the seventh signal, wherein both the fourth signal and the sixth signal are approximations to the square root of the first signal, and wherein both the second signal and the seventh signal are approximations to the reciprocal of the square root of the first signal.

25. The method of claim 24 further comprising multiplying the fourth signal by a sign.

26. The method of claim 24 wherein the constant is equal to two, and wherein the scaling of the fifth signal comprises scaling the fifth signal by one-

half to produce the sixth signal.

27. The method of claim 26 further comprising multiplying the fourth signal by a sign.